

CLAIMS

WHAT IS CLAIMED IS:

1. A drill bit comprising:
 - a bit body with a bit central axis, and that defines a gage diameter;
 - a first roller cone, attached to said bit body, rotatable around a first journal axis;
 - a first row of cutting elements attached to said first roller cone that includes a first cutting element, said first cutting element having a first cutting tip;
 - a first cutting tip curve defined by rotating first roller cone with attached first cutting tip around said first journal axis;
 - a first nozzle receptacle in said bit body that defines a first projected fluid path, said first nozzle receptacle being located from 25% to 100% of the distance between said central axis and said gage diameter;
 - said first projected fluid path being within 0.4 inches of said first cutting tip curve;
 - a second roller cone, attached to said bit body, rotatable around a second journal axis;
 - a second row of cutting elements attached to said second roller cone that includes a second cutting element, said second cutting element having a second cutting tip;
 - a second cutting tip curve defined by rotating second roller cone with attached second cutting tip around said second journal axis;
 - a second nozzle receptacle in said bit body that defines a second projected fluid path;
 - said second projected fluid path being within 0.4 inches of said second cutting tip curve;
 - a first distance from said first nozzle receptacle to said bit central axis;
 - a second distance from said second nozzle receptacle to said bit central axis;
 - a first angle between said first journal axis and said first nozzle receptacle;

a second angle between said second journal axis and said second nozzle receptacle;

wherein at least one is selected from the group consisting of:

said first distance differs from said second distance; and

said first angle differs from said second angle.

2. The drill bit of claim 1, said drill bit having a diameter of at least seven and seven-eighths inches.

3. The drill bit of claim 2, said first projected fluid path being within 0.3 inches of said first cutting tip curve and said second projected fluid path being within 0.3 inches of said second cutting tip curve.

4. The drill bit of claim 2, said first projected fluid path being within 0.2 inches of said first cutting tip curve and said second projected fluid path being within 0.2 inches of said second cutting tip curve.

5. The drill bit of claim 3, wherein said drill bit defines a gage diameter, said first row of cutting elements is a gage row that cuts to about said gage diameter, and said second row of cutting elements is a gage row that cuts to about said gage diameter.

6. The drill bit of claim 4, wherein said drill bit defines a gage diameter, said first row of cutting elements is a gage row that cuts to about said gage diameter, and said second row of cutting elements is a gage row that cuts to about said gage diameter.

7. The drill bit of claim 2, further comprising:
- a third row of cutting elements attached to said first roller cone;
 - a fourth row of cutting elements attached to said second roller cone;
 - wherein said drill bit defines a gage diameter,
 - said third row of cutting elements being a gage row that cuts to about said gage diameter;
 - said fourth row of cutting elements being a gage row that cuts to about said gage diameter;
 - said first row of cutting elements being a drive row that does not cut to said about said gage diameter; and
 - said second row of cutting elements being a drive row that does not cut to about said gage diameter.
8. The drill bit of claim 7, said first projected fluid path being between said first and third rows at its closest to said first cutting tip curve and said second projected fluid path being between said second and fourth rows at its closest to said second cutting tip curve.
9. The drill bit of claim 4, further comprising:
- a third row of cutting elements attached to said first roller cone;
 - a fourth row of cutting elements attached to said second roller cone;
 - wherein said drill bit defines a gage diameter,
 - said third row of cutting elements being a gage row that cuts to about said gage diameter;
 - said fourth row of cutting elements being a gage row that cuts to about said gage diameter;
 - said first row of cutting elements being a drive row that does not cut to said about said gage diameter; and

said second row of cutting elements being a drive row that does not cut to about said gage diameter.

10. The drill bit of claim 3, further comprising:

a third row of cutting elements attached to said first roller cone;

a fourth row of cutting elements attached to said second roller cone;

wherein said drill bit defines a gage diameter,

said third row of cutting elements being a gage row that cuts to about said gage diameter;

said fourth row of cutting elements being a gage row that cuts to about said gage diameter;

said first row of cutting elements being a drive row that does not cut to said about said gage diameter; and

said second row of cutting elements being a drive row that does not cut to about said gage diameter.

11. The drill bit of claim 9, said first projected fluid path being between said first and third rows at its closest to said first cutting tip curve and said second projected fluid path being between said second and fourth rows at its closest to said second cutting tip curve.

12. The drill bit of claim 10, said first projected fluid path being between said first and third rows at its closest to said first cutting tip curve and said second projected fluid path being between said second and fourth rows at its closest to said second cutting tip curve.

13. The drill bit of claim 2, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;

a third nozzle receptacle in said bit body that defines a third projected fluid path;

said third projected fluid path being within 0.4 inches of said third cutting tip curve.

14. The drill bit of claim 2, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;

a third nozzle receptacle in said bit body that defines a third projected fluid path;

said third projected fluid path being within 0.3 inches of said third cutting tip curve.

15. The drill bit of claim 2, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;

a third nozzle receptacle in said bit body that defines a third projected fluid path;
said third projected fluid path being within 0.2 inches of said third cutting tip curve.

16. The drill bit of claim 2, further comprising:
- a third row of cutting elements on said first roller cone;
 - a fourth row of cutting elements on said second roller cone;
 - said first row being a gage row and said second row being a gage row;
 - said third row being a drive row and said fourth row being a drive row;
 - the shortest distance between said first row and said third row being different from the shortest distance between said second row and said fourth row.

17. The drill bit of claim 3, further comprising:
- a third row of cutting elements on said first roller cone;
 - a fourth row of cutting elements on said second roller cone;
 - said first row being a gage row and said second row being a gage row;
 - said third row being a drive row and said fourth row being a drive row;
 - the shortest distance between said first row and said third row being different from the shortest distance between said second row and said fourth row.

18. The drill bit of claim 4, further comprising:
- a third row of cutting elements on said first roller cone;
 - a fourth row of cutting elements on said second roller cone;
 - said first row being a gage row and said second row being a gage row;

said third row being a drive row and said fourth row being a drive row;

the shortest distance between said first row and said third row being different from the shortest distance between said second row and said fourth row.

19. The drill bit of claim 2, said drill bit having a bit radius, a bottom, and defining a cutting plane at perpendicular to said bit central axis the lowermost point of said bottom, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

20. The drill bit of claim 3, said drill bit having a bottom and defining a cutting plane at said bottom, and a bit radius, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

21. The drill bit of claim 4, said drill bit having a bottom and defining a cutting plane at said bottom, and a bit radius, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

22. The drill bit of claim 20, said drill bit further comprising:

a radial angle for said second projected fluid path such that said second projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

23. The drill bit of claim 21, said drill bit further comprising:

a radial angle for said second projected fluid path such that said second projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

24. The drill bit of claim 2, said drill bit having a bottom and defining a cutting plane at said bottom, and a bit radius, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 60 percent to 120 percent of said bit radius.

25. The drill bit of claim 3, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 60 percent to 120 percent of said bit radius.

26. The drill bit of claim 4, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 60 percent to 120 percent of said bit radius.

27. The drill bit of claim 24, said drill bit further comprising:

a radial angle for said second projected fluid path such that said second projected fluid path intersects said cutting plane at a location from 60 percent to 120 percent of said bit radius.

28. The drill bit of claim 25, said drill bit further comprising:

a radial angle for said second projected fluid path such that said second projected fluid path intersects said cutting plane at a location from 60 percent to 120 percent of said bit radius.

29. The drill bit of claim 26, said drill bit further comprising:

a radial angle for said second projected fluid path such that said second projected fluid path intersects said cutting plane at a location from 60 percent to 120 percent of said bit radius.

30. The drill bit of claim 2, wherein both said first distance differs from said second distance, and said first angle differs from said second angle.

31. The drill bit of claim 3, wherein both said first distance differs from said second distance, and said first angle differs from said second angle.

32. The drill bit of claim 4, wherein both said first distance differs from said second distance, and said first angle differs from said second angle.

33. The drill bit of claim 2, further comprising:

a first nozzle, installed in said first nozzle receptacle, that defines a third projected fluid path collinear with said first projected fluid path; and

a second nozzle, installed in said second nozzle receptacle, that defines a fourth projected fluid path collinear with said second projected fluid path.

34. The drill bit of claim 3, further comprising:

a first nozzle, installed in said first nozzle receptacle, that defines a third projected fluid path collinear with said first projected fluid path; and

a second nozzle, installed in said second nozzle receptacle, that defines a fourth projected fluid path collinear with said second projected fluid path.

35. The drill bit of claim 4, further comprising:

a first nozzle, installed in said first nozzle receptacle, that defines a third projected fluid path collinear with said first projected fluid path; and

a second nozzle, installed in said second nozzle receptacle, that defines a fourth projected fluid path collinear with said second projected fluid path.

36. The drill bit of claim 33, said third projected fluid path being a face normal projected fluid path.

37. The drill bit of claim 34, said third projected fluid path being a face normal projected fluid path.

38. The drill bit of claim 35, said third projected fluid path being a face normal projected fluid path.

39. The drill bit of claim 33, said third projected fluid path being a parallel to nozzle centerline projected fluid path.

40. The drill bit of claim 34, said third projected fluid path being a parallel to nozzle centerline projected fluid path.

41. The drill bit of claim 35, said third projected fluid path being a parallel to nozzle centerline projected fluid path.

42. The drill bit of claim 33, said third projected fluid path being a projected average fluid path.

43. The drill bit of claim 34, said third projected fluid path being a projected average fluid path.

44. The drill bit of claim 35, said third projected fluid path being a projected average fluid path.

45. The drill bit of claim 33, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third nozzle receptacle in said bit body that defines a fifth projected fluid path;

a third nozzle, installed in said third nozzle receptacle, that defines a sixth projected fluid path collinear with said fifth projected fluid path; and

said fifth and sixth projected fluid paths being within 0.4 inches of said third cutting tip curve.

46. The drill bit of claim 34, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third nozzle receptacle in said bit body that defines a fifth projected fluid path;

a third nozzle, installed in said third nozzle receptacle, that defines a sixth projected fluid path collinear with said fifth projected fluid path; and

said fifth and sixth projected fluid paths being within 0.3 inches of said third cutting tip curve.

47. The drill bit of claim 35, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third nozzle receptacle in said bit body that defines a fifth projected fluid path;

a third nozzle, installed in said third nozzle receptacle, that defines a sixth projected fluid path collinear with said fifth projected fluid path; and

said fifth and sixth projected fluid paths being within 0.2 inches of said third cutting tip curve.

48. The drill bit of claim 2, further comprising:
a first nozzle with a straight internal bore, installed in said first nozzle receptacle; and
a second nozzle with a straight internal bore, installed in said second nozzle receptacle.
49. The drill bit of claim 3, further comprising:
a first nozzle with a straight internal bore, installed in said first nozzle receptacle; and
a second nozzle with a straight internal bore, installed in said second nozzle receptacle.
50. The drill bit of claim 4, further comprising:
a first nozzle with a straight internal bore, installed in said first nozzle receptacle; and
a second nozzle with a straight internal bore, installed in said second nozzle receptacle.
51. The drill bit of claim 2, said first row of cutting elements being the same relative row number, counting from a gage row on said first roller cone, as said second row of cutting elements, counting from a gage row on said second roller cone.
52. The drill bit of claim 51, said first projected fluid path being within 0.3 inches of said first cutting tip curve and said second projected fluid path being within 0.3 inches of said second cutting tip curve.
53. The drill bit of claim 51, said first projected fluid path being within 0.2 inches of said first cutting tip curve and said second projected fluid path being within 0.2 inches of said second cutting tip curve.

54. The drill bit of claim 2, further comprising:

- a third roller cone, attached to said bit body, rotatable around a third journal axis;
- a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and
- a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;
- a third nozzle receptacle in said bit body that defines a third projected fluid path;

wherein said drill bit defines a gage diameter,

- said first row of cutting elements being a gage row that cuts to about said gage diameter;
- said second row of cutting elements being a gage row that cuts to about said gage diameter;
- said third row of cutting elements being a gage row that cuts to about said gage diameter;

wherein said first projected fluid path is within 0.2 inches of said first cutting tip curve, said second projected fluid path is within 0.2 inches of said second cutting tip curve; and said third projected fluid path is within 0.2 inches of said third cutting tip curve.

55. The drill bit of claim 2, further comprising:

- a third roller cone, attached to said bit body, rotatable around a third journal axis;
- a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and
- a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;
- a third nozzle receptacle in said bit body that defines a third projected fluid path;

wherein said drill bit defines a gage diameter,

said first row of cutting elements being a gage row that cuts to about said gage diameter;
said second row of cutting elements being a gage row that cuts to about said gage diameter;
said third row of cutting elements being a gage row that cuts to about said gage diameter;
wherein said first projected fluid path is within 0.3 inches of said first cutting tip curve, said
second projected fluid path is within 0.3 inches of said second cutting tip curve; and said third
projected fluid path is within 0.3 inches of said third cutting tip curve.

56. The drill bit of claim 2, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;
a third row of cutting elements attached to said third roller cone that includes a third cutting
element, said third cutting element having a third cutting tip; and
a third cutting tip curve defined by rotating said third roller cone with attached third cutting
tip around said third journal axis;
a third nozzle receptacle in said bit body that defines a third projected fluid path;
said first row of cutting elements being the same relative row number, counting from a gage
row on said first roller cone, as said second row of cutting elements, counting from a gage row on
said second roller cone, and said third row of cutting elements, counting from a gage row on said
third roller cone.

57. The drill bit of claim 56, said first projected fluid path being within 0.3 inches of said first
cutting tip curve, said second projected fluid path being within 0.3 inches of said second cutting tip
curve, and said third projected fluid path being within 0.3 inches of said third cutting tip curve.

58. The drill bit of claim 56, said first projected fluid path being within 0.2 inches of said first cutting tip curve, said second projected fluid path being within 0.2 inches of said second cutting tip curve, and said third projected fluid path being within 0.2 inches of said third cutting tip curve.

59. The drill bit of claim 2, wherein every non-central nozzle receptacle on said drill bit body defines a projected fluid path and every cutting element on a roller cone defines a cutting tip curve, every projected fluid path from a non-central nozzle receptacle being within 0.4 inches of a cutting tip curve.

60. The drill bit of claim 2, wherein every non-central nozzle receptacle on said drill bit body defines a projected fluid path and every cutting element on a roller cone defines a cutting tip curve, every projected fluid path from a non-central nozzle receptacle being within 0.3 inches of a cutting tip curve.

61. The drill bit of claim 2, wherein every non-central nozzle receptacle on said drill bit body defines a projected fluid path and every cutting element on a roller cone defines a cutting tip curve, every projected fluid path from a non-central nozzle receptacle being within 0.2 inches of a cutting tip curve.

62. The drill bit of claim 1, said drill bit having a diameter of at least five and seven eighths inch diameter but less than seven and seven eighths inch diameter, said first projected fluid path being within 0.3 inches of said first cutting tip curve and said second projected fluid path being within 0.3 inches of said second cutting tip curve.

63. The drill bit of claim 1, said drill bit having a diameter of at least five and seven eighths inch diameter but less than seven and seven eighths inch diameter, said first projected fluid path being within 0.2 inches of said first cutting tip curve and said second projected fluid path being within 0.2 inches of said second cutting tip curve.

64. The drill bit of claim 62, wherein said drill bit defines a gage diameter, said first row of cutting elements is a gage row that cuts to about said gage diameter, and said second row of cutting elements is a gage row that cuts to about said gage diameter.

65. The drill bit of claim 63, wherein said drill bit defines a gage diameter, said first row of cutting elements is a gage row that cuts to about said gage diameter, and said second row of cutting elements is a gage row that cuts to about said gage diameter.

66. The drill bit of claim 62, further comprising:
a third row of cutting elements attached to said first roller cone;
a fourth row of cutting elements attached to said second roller cone;
wherein said drill bit defines a gage diameter,
said third row of cutting elements being a gage row that cuts to about said gage diameter;
said fourth row of cutting elements being a gage row that cuts to about said gage diameter;
said first row of cutting elements being a drive row that does not cut to said about said gage diameter; and

said second row of cutting elements being a drive row that does not cut to about said gage diameter.

67. The drill bit of claim 66, said first projected fluid path being between said first and third rows at its closest to said first cutting tip curve and said second projected fluid path being between said second and fourth rows at its closest to said second cutting tip curve.

68. The drill bit of claim 63, further comprising:

a third row of cutting elements attached to said first roller cone;

a fourth row of cutting elements attached to said second roller cone;

wherein said drill bit defines a gage diameter,

said third row of cutting elements being a gage row that cuts to about said gage diameter;

said fourth row of cutting elements being a gage row that cuts to about said gage diameter;

said first row of cutting elements being a drive row that does not cut to said about said gage diameter; and

said second row of cutting elements being a drive row that does not cut to about said gage diameter.

69. The drill bit of claim 68, said first projected fluid path being between said first and third rows at its closest to said first cutting tip curve and said second projected fluid path being between said second and fourth rows at its closest to said second cutting tip curve.

70. The drill bit of claim 62, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;

a third nozzle receptacle in said bit body that defines a third projected fluid path;

said third projected fluid path being within 0.3 inches of said third cutting tip curve.

71. The drill bit of claim 63, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;

a third nozzle receptacle in said bit body that defines a third projected fluid path;

said third projected fluid path being within 0.2 inches of said third cutting tip curve.

72. The drill bit of claim 62, further comprising:

a third row of cutting elements on said first roller cone;

a fourth row of cutting elements on said second roller cone;

said first row being a gage row and said second row being a gage row;

said third row being a drive row and said fourth row being a drive row;

the shortest distance between said first row and said third row being different from the shortest distance between said second row and said fourth row.

73. The drill bit of claim 63, further comprising:

- a third row of cutting elements on said first roller cone;
- a fourth row of cutting elements on said second roller cone;
- said first row being a gage row and said second row being a gage row;
- said third row being a drive row and said fourth row being a drive row;
- the shortest distance between said first row and said third row being different from the shortest distance between said second row and said fourth row.

74. The drill bit of claim 62, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

- a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

75. The drill bit of claim 63, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

- a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

76. The drill bit of claim 62, said drill bit further comprising:

- a radial angle for said second projected fluid path such that said second projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

77. The drill bit of claim 63, said drill bit further comprising:

a radial angle for said second projected fluid path such that said second projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

78. The drill bit of claim 62, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 60 percent to 120 percent of said bit radius.

79. The drill bit of claim 63, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 60 percent to 120 percent of said bit radius.

80. The drill bit of claim 62, wherein both said first distance differs from said second distance, and said first angle differs from said second angle.

81. The drill bit of claim 63, wherein both said first distance differs from said second distance, and said first angle differs from said second angle.

82. The drill bit of claim 62, further comprising:

a first nozzle, installed in said first nozzle receptacle, that defines a third projected fluid path collinear with said first projected fluid path; and

a second nozzle, installed in said second nozzle receptacle, that defines a fourth projected fluid path collinear with said second projected fluid path.

83. The drill bit of claim 63, further comprising:

a first nozzle, installed in said first nozzle receptacle, that defines a third projected fluid path collinear with said first projected fluid path; and

a second nozzle, installed in said second nozzle receptacle, that defines a fourth projected fluid path collinear with said second projected fluid path.

84. The drill bit of claim 82, said third projected fluid path being a face normal projected fluid path.

85. The drill bit of claim 83, said third projected fluid path being a face normal projected fluid path.

86. The drill bit of claim 82, said third projected fluid path being a parallel to nozzle centerline projected fluid path.

87. The drill bit of claim 83, said third projected fluid path being a parallel to nozzle centerline projected fluid path.

88. The drill bit of claim 82, said third projected fluid path being a projected average fluid path.

89. The drill bit of claim 83, said third projected fluid path being a projected average fluid path.

90. The drill bit of claim 82, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third nozzle receptacle in said bit body that defines a fifth projected fluid path;

a third nozzle, installed in said third nozzle receptacle, that defines a sixth projected fluid path collinear with said fifth projected fluid path; and

said fifth and sixth projected fluid paths being within 0.3 inches of said third cutting tip curve.

91. The drill bit of claim 83, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third nozzle receptacle in said bit body that defines a fifth projected fluid path;

a third nozzle, installed in said third nozzle receptacle, that defines a sixth projected fluid path collinear with said fifth projected fluid path; and

said fifth and sixth projected fluid paths being within 0.2 inches of said third cutting tip curve.

92. The drill bit of claim 62, further comprising:

a first nozzle with a straight internal bore, installed in said first nozzle receptacle; and
a second nozzle with a straight internal bore, installed in said second nozzle receptacle.

93. The drill bit of claim 63, further comprising:

a first nozzle with a straight internal bore, installed in said first nozzle receptacle; and
a second nozzle with a straight internal bore, installed in said second nozzle receptacle.

94. The drill bit of claim 62, said first row of cutting elements being the same relative row number, counting from a gage row on said first roller cone, as said second row of cutting elements, counting from a gage row on said second roller cone.

95. The drill bit of claim 63, said first row of cutting elements being the same relative row number, counting from a gage row on said first roller cone, as said second row of cutting elements, counting from a gage row on said second roller cone.

96. The drill bit of claim 62, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;

a third nozzle receptacle in said bit body that defines a third projected fluid path;

wherein said drill bit defines a gage diameter,

said first row of cutting elements being a gage row that cuts to about said gage diameter;
said second row of cutting elements being a gage row that cuts to about said gage diameter;
said third row of cutting elements being a gage row that cuts to about said gage diameter;
wherein said first projected fluid path is within 0.3 inches of said first cutting tip curve, said
second projected fluid path is within 0.3 inches of said second cutting tip curve; and said third
projected fluid path is within 0.3 inches of said third cutting tip curve.

97. The drill bit of claim 63, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;
a third row of cutting elements attached to said third roller cone that includes a third cutting
element, said third cutting element having a third cutting tip; and
a third cutting tip curve defined by rotating said third roller cone with attached third cutting
tip around said third journal axis;
a third nozzle receptacle in said bit body that defines a third projected fluid path;
wherein said drill bit defines a gage diameter,
said first row of cutting elements being a gage row that cuts to about said gage diameter;
said second row of cutting elements being a gage row that cuts to about said gage diameter;
said third row of cutting elements being a gage row that cuts to about said gage diameter;
wherein said first projected fluid path is within 0.2 inches of said first cutting tip curve, said
second projected fluid path is within 0.2 inches of said second cutting tip curve; and said third
projected fluid path is within 0.2 inches of said third cutting tip curve.

98. The drill bit of claim 62, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third cutting tip curve defined by rotating third roller cone with attached third cutting tip around said third journal axis;

a third nozzle receptacle in said bit body that defines a third projected fluid path, said third projected fluid path being within 0.3 inches of said third cutting tip curve;

said first row of cutting elements being the same relative row number, counting from a gage row on said first roller cone, as said second row of cutting elements, counting from a gage row on said second roller cone, and said third row of cutting elements, counting from a gage row on said third roller cone.

99. The drill bit of claim 62, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third cutting tip curve defined by rotating third roller cone with attached third cutting tip around said third journal axis;

a third nozzle receptacle in said bit body that defines a third projected fluid path, said third projected fluid path being within 0.2 inches of said third cutting tip curve;

said first row of cutting elements being the same relative row number, counting from a gage row on said first roller cone, as said second row of cutting elements, counting from a gage row on

said second roller cone, and said third row of cutting elements, counting from a gage row on said third roller cone.

100. The drill bit of claim 94, said first projected fluid path being within 0.3 inches of said first cutting tip curve, said second projected fluid path being within 0.3 inches of said second cutting tip curve, and said third projected fluid path being within 0.3 inches of said third cutting tip curve.

101. The drill bit of claim 95, said first projected fluid path being within 0.2 inches of said first cutting tip curve, said second projected fluid path being within 0.2 inches of said second cutting tip curve, and said third projected fluid path being within 0.2 inches of said third cutting tip curve.

102. The drill bit of claim 62, wherein every non-central nozzle receptacle on said drill bit body defines a projected fluid path and every cutting element on a roller cone defines a cutting tip curve, every projected fluid path from a non-central nozzle receptacle being within 0.3 inches of a cutting tip curve.

103. The drill bit of claim 63, wherein every non-central nozzle receptacle on said drill bit body defines a projected fluid path and every cutting element on a roller cone defines a cutting tip curve, every projected fluid path from a non-central nozzle receptacle being within 0.2 inches of a cutting tip curve.

104. A drill bit comprising:

a bit body with a bit central axis, and defining a gage diameter;

a first roller cone with a first cone shell, attached to said bit body, rotatable around a first journal axis;

a first row of cutting elements attached to said first roller cone that includes a first cutting element, said first cutting element having a first cutting tip;

a first cutting tip curve defined by rotating first roller cone with attached first cutting tip around said first journal axis;

a first nozzle receptacle in said bit body;

a first nozzle, installed in said first nozzle receptacle, that defines a first projected fluid path and that forms a first centroid at an exit location, said centroid being located greater than 25% of the distance between said central axis and gage diameter from said central axis;

said first projected fluid path being within 0.4 inches of said first cutting tip curve;

a second roller cone with a second cone shell, attached to said bit body, rotatable around a second journal axis;

a second row of cutting elements attached to said second roller cone that includes a second cutting element, said second cutting element having a second cutting tip;

a second cutting tip curve defined by rotating second roller cone with attached second cutting tip around said second journal axis;

a second nozzle receptacle in said bit body;

a second nozzle, installed in said second nozzle receptacle, that defines a second projected fluid path and that forms a second centroid at an exit location, said second centroid being located greater than 25 % of the distance between said central axis and gage diameter from said central axis;

said second projected fluid path being within 0.4 inches of said second cutting tip curve;

a lateral angle for said first projected fluid path defined with respect to a first plane, said first plane being defined by said bit body central axis, and by a first line lying parallel to said bit body central axis and intersecting said first centroid;

a radial angle for said first projected fluid path defined with respect to a second plane, said second plane being perpendicular to said first plane and parallel to said central axis;

a lateral angle for said second projected fluid path defined with respect to a third plane, said third plane being defined by said bit body central axis, and by a second line lying parallel to said bit body central axis and intersecting said second centroid;

a radial angle for said second projected fluid path defined with respect to a fourth plane, said fourth plane being perpendicular to said third plane and parallel to said central axis;

wherein the lateral and radial angles of said first projected fluid path differ from said lateral and radial angles of said second projected fluid path such that the spatial relationship between said first projected fluid path and said first cone shell differs from the spatial relationship between said second projected fluid path and said second cone shell.

105. The drill bit of claim 104, said drill bit having a diameter of at least seven and seven eighth inches.

106. The drill bit of claim 105, said first projected fluid path being within 0.3 inches of said first cutting tip curve and said second projected fluid path being within 0.3 inches of said second cutting tip curve.

107. The drill bit of claim 105, said first projected fluid path being within 0.2 inches of said first cutting tip curve and said second projected fluid path being within 0.2 inches of said second cutting tip curve.

108. The drill bit of claim 105, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a cutting tip; and

a third nozzle receptacle in said bit body that defines a third projected fluid path;

said third projected fluid path being within 0.4 inches of said third cutting tip curve.

109. The drill bit of claim 108, wherein said drill bit defines a gage diameter, said first row of cutting elements is a gage row that cuts to about said gage diameter, and said second row of cutting elements is a gage row that cuts to about said gage diameter, and said third row of cutting elements is a gage row that cuts to about said gage diameter.

110. The drill bit of claim 105, further comprising:

a third row of cutting elements attached to said first roller cone;

a fourth row of cutting elements attached to said second roller cone;

wherein said drill bit defines a gage diameter,

said third row of cutting elements being a gage row that cuts to about said gage diameter;

said fourth row of cutting elements being a gage row that cuts to about said gage diameter;

said first row of cutting elements being a drive row that does not cut to said about said gage diameter; and

said second row of cutting elements being a drive row that does not cut to about said gage diameter.

111. The drill bit of claim 110, said first projected fluid path being between said first and third rows at its closest to said first cutting tip curve and said second projected fluid path being between said second and fourth rows at its closest to said second cutting tip curve.

112. The drill bit of claim 107, further comprising:

a third row of cutting elements attached to said first roller cone;

a fourth row of cutting elements attached to said second roller cone;

wherein said drill bit defines a gage diameter,

said third row of cutting elements being a gage row that cuts to about said gage diameter;

said fourth row of cutting elements being a gage row that cuts to about said gage diameter;

said first row of cutting elements being a drive row that does not cut to said about said gage diameter; and

said second row of cutting elements being a drive row that does not cut to about said gage diameter.

113. The drill bit of claim 112, said first projected fluid path being between said first and third rows at its closest to said first cutting tip curve and said second projected fluid path being between said second and fourth rows at its closest to said second cutting tip curve.

114. The drill bit of claim 105, further comprising:
- a third roller cone, attached to said bit body, rotatable around a third journal axis;
 - a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and
 - a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;
 - a third nozzle receptacle in said bit body that defines a third projected fluid path;
 - said third projected fluid path being within 0.3 inches of said third cutting tip curve.
115. The drill bit of claim 105, further comprising:
- a third roller cone, attached to said bit body, rotatable around a third journal axis;
 - a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and
 - a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;
 - a third nozzle receptacle in said bit body that defines a third projected fluid path;
 - said third projected fluid path being within 0.2 inches of said third cutting tip curve
116. The drill bit of claim 105, further comprising:
- a third row of cutting elements on said first roller cone;
 - a fourth row of cutting elements on said second roller cone;
 - said first row being a gage row and said second row being a gage row;

said third row being a drive row and said fourth row being a drive row;

the shortest distance between said first row and said third row being different from the shortest distance between said second row and said fourth row.

117. The drill bit of claim 106, further comprising:

a third row of cutting elements on said first roller cone;

a fourth row of cutting elements on said second roller cone;

said first row being a gage row and said second row being a gage row;

said third row being a drive row and said fourth row being a drive row;

the shortest distance between said first row and said third row being different from the shortest distance between said second row and said fourth row.

118. The drill bit of claim 107, further comprising:

a third row of cutting elements on said first roller cone;

a fourth row of cutting elements on said second roller cone;

said first row being a gage row and said second row being a gage row;

said third row being a drive row and said fourth row being a drive row;

the shortest distance between said first row and said third row being different from the shortest distance between said second row and said fourth row.

119. The drill bit of claim 105, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

120. The drill bit of claim 106, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

121. The drill bit of claim 107, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 55 percent to 100 percent of said bit radius.

122. The drill bit of claim 105, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 60 percent to 120 percent of said bit radius.

123. The drill bit of claim 106, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 60 percent to 120 percent of said bit radius.

124. The drill bit of claim 107, said drill bit having a bit radius, a bottom, and defining a cutting plane perpendicular to said bit central axis at the lowermost point of said bottom, said drill bit further comprising:

a radial angle for said first projected fluid path such that said first projected fluid path intersects said cutting plane at a location from 60 percent to 120 percent of said bit radius.

125. The drill bit of claim 105, said first projected fluid path being a face normal projected fluid path.

126. The drill bit of claim 106, said first projected fluid path being a face normal projected fluid path.

127. The drill bit of claim 107, said first projected fluid path being a face normal projected fluid path.

128. The drill bit of claim 105, said first projected fluid path being a parallel to nozzle centerline projected fluid path.

129. The drill bit of claim 106, said first projected fluid path being a parallel to nozzle centerline projected fluid path.

130. The drill bit of claim 107, said first projected fluid path being a parallel to nozzle centerline projected fluid path.

131. The drill bit of claim 105, said first projected fluid path being a projected average fluid path.

132. The drill bit of claim 106, said first projected fluid path being a projected average fluid path.

133. The drill bit of claim 107, said first projected fluid path being a projected average fluid path.

134. The drill bit of claim 105, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third nozzle receptacle in said bit body;

a third nozzle, installed in said third nozzle receptacle, that defines a third projected fluid path collinear with said fifth projected fluid path; and

said third projected fluid paths being within 0.4 inches of said third cutting tip curve.

135. The drill bit of claim 105, further comprising:

said first nozzle having a straight internal bore; and

said second nozzle having a straight internal bore.

136. The drill bit of claim 106, further comprising:

said first nozzle having a straight internal bore; and

said second nozzle having a straight internal bore.

137. The drill bit of claim 107, further comprising:

said first nozzle having a straight internal bore; and

said second nozzle having a straight internal bore.

138. The drill bit of claim 105, said first row of cutting elements being the same relative row number, counting from a gage row on said first roller cone, as said second row of cutting elements, counting from a gage row on said second roller cone.

139. The drill bit of claim 138, said first projected fluid path being within 0.3 inches of said first cutting tip curve and said second projected fluid path being within 0.3 inches of said second cutting tip curve.

140. The drill bit of claim 138, said first projected fluid path being within 0.2 inches of said first cutting tip curve and said second projected fluid path being within 0.2 inches of said second cutting tip curve.

141. The drill bit of claim 105, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;

a third nozzle receptacle in said bit body that defines a third projected fluid path;

wherein said drill bit defines a gage diameter,

said first row of cutting elements being a gage row that cuts to about said gage diameter;

said second row of cutting elements being a gage row that cuts to about said gage diameter;

said third row of cutting elements being a gage row that cuts to about said gage diameter;

wherein said first projected fluid path is within 0.2 inches of said first cutting tip curve, said second projected fluid path is within 0.2 inches of said second cutting tip curve; and said third projected fluid path is within 0.2 inches of said third cutting tip curve.

142. The drill bit of claim 105, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and

a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;

a third nozzle receptacle in said bit body that defines a third projected fluid path;

wherein said drill bit defines a gage diameter,

said first row of cutting elements being a gage row that cuts to about said gage diameter;

said second row of cutting elements being a gage row that cuts to about said gage diameter;
said third row of cutting elements being a gage row that cuts to about said gage diameter;
wherein said first projected fluid path is within 0.3 inches of said first cutting tip curve, said second projected fluid path is within 0.3 inches of said second cutting tip curve; and said third projected fluid path is within 0.3 inches of said third cutting tip curve.

143. The drill bit of claim 105, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;
a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip; and
a third cutting tip curve defined by rotating said third roller cone with attached third cutting tip around said third journal axis;
a third nozzle receptacle in said bit body that defines a third projected fluid path, said third projected fluid path being within 0.4 inches of said third cutting tip curve;
said first row of cutting elements being the same relative row number, counting from a gage row on said first roller cone, as said second row of cutting elements, counting from a gage row on said second roller cone, and said third row of cutting elements, counting from a gage row on said third roller cone.

144. The drill bit of claim 143, said first projected fluid path being within 0.3 inches of said first cutting tip curve, said second projected fluid path being within 0.3 inches of said second cutting tip curve, and said third projected fluid path being within 0.3 inches of said third cutting tip curve.

145. The drill bit of claim 143, said first projected fluid path being within 0.2 inches of said first cutting tip curve, said second projected fluid path being within 0.2 inches of said second cutting tip curve, and said third projected fluid path being within 0.2 inches of said third cutting tip curve.

146. The drill bit of claim 105, wherein every nozzle receptacle on said drill bit body defines a projected fluid path and every cutting element on a roller cone defines a cutting tip curve, every projected fluid path being within 0.4 inches of a cutting tip curve.

147. The drill bit of claim 106, wherein every nozzle receptacle on said drill bit body defines a projected fluid path and every cutting element on a roller cone defines a cutting tip curve, every projected fluid path being within 0.3 inches of a cutting tip curve.

148. The drill bit of claim 107, wherein every nozzle receptacle on said drill bit body defines a projected fluid path and every cutting element on a roller cone defines a cutting tip curve, every projected fluid path being within 0.2 inches of a cutting tip curve.

149. The drill bit of claim 106, said drill bit having a diameter of at least five and seven eighths inch diameter but less than seven and seven eighths inch diameter, said first projected fluid path being within 0.3 inches of said first cutting tip curve and said second projected fluid path being within 0.3 inches of said second cutting tip curve.

150. The drill bit of claim 107, said drill bit having a diameter of at least five and seven eighths inch diameter but less than seven and seven eighths inch diameter, said first projected fluid path

being within 0.2 inches of said first cutting tip curve and said second projected fluid path being within 0.2 inches of said second cutting tip curve.

151. A rolling cone rock bit, comprising:

- a bit body having a diameter of at least five and seven-eighth inches, with a bit central axis and defining a gage diameter;

- a first roller cone with a first cone shell, attached to said bit body, rotatable around a first journal axis;

- a first row of cutting elements attached to said first roller cone that includes a first cutting element, said first cutting element having a first cutting tip, said first row of cutting elements being a gage row that cuts to about said gage diameter;

- a first cutting tip curve defined by said first cutting tip when rotated around said first journal axis;

- a first nozzle receptacle in said bit body;

- a first nozzle, installed in said first nozzle receptacle, that defines a first projected fluid path and that forms a first centroid at an exit location;

- said first projected fluid path being within 0.3 inches of said first cutting tip curve;

- a second roller cone with a second cone shell, attached to said bit body, rotatable around a second journal axis;

- a second row of cutting elements attached to said second roller cone that includes a second cutting element, said second cutting element having a second cutting tip, said second row of cutting elements being a gage row that cuts to about said gage diameter;

a second cutting tip curve defined by rotating second roller cone with attached second cutting tip around said second journal axis;

a second nozzle receptacle in said bit body;

a second nozzle, installed in said second nozzle receptacle, that defines a second projected fluid path and that forms a second centroid at an exit location;

a third roller cone with a third cone shell, attached to said bit body, rotatable around a third journal axis;

a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a third cutting tip, said third row of cutting elements being a gage row that cuts to about said gage diameter;

a third cutting tip curve defined by said third cutting tip when rotated around said third journal axis;

a third nozzle receptacle in said bit body;

a third nozzle, installed in said third nozzle receptacle, that defines a third projected fluid path and that forms a third centroid at an exit location; and

wherein every projected fluid path within 1.0 inches of said first cutting tip curve at closest is also within 0.3 inches of said first cutting tip curve;

wherein every projected fluid path within 1.0 inches of said second cutting tip curve at closest is also within 0.3 inches of said second cutting tip curve; and

wherein every projected fluid path within 1.0 inches of said third cutting tip curve at closest is also within 0.3 inches of said third cutting tip curve.

152. The drill bit of claim 151, wherein said first, second, and third nozzle receptacles located greater than one-quarter of the way between said bit central axis and said gage diameter.

153. The drill bit of claim 151, wherein

said first projected fluid path is within 0.2 inches of said first cutting tip curve;

wherein every projected fluid path that is within 1.0 inches of said first cutting tip curve at closest is also within 0.2 inches of said first cutting tip curve;

wherein every projected fluid path that is within 1.0 inches of said second cutting tip curve at closest is also within 0.2 inches of said second cutting tip curve; and

wherein every projected fluid path that is within 1.0 inches of said third cutting tip curve at closest is also within 0.2 inches of said third cutting tip curve.

154. The rolling cone rock bit of claim 151, each of said projected fluid paths being face normal projected fluid paths.

155. The rolling cone rock bit of claim 151, each of said projected fluid paths being parallel to nozzle centerline projected fluid paths.

156. The rolling cone rock bit of claim 151, each of said projected fluid paths being a projected average fluid path.

157. The rolling cone rock bit of claim 153, each of said projected fluid paths being face normal projected fluid paths.

158. The rolling cone rock bit of claim 153, each of said projected fluid paths being parallel to nozzle centerline projected fluid paths.

159. The rolling cone rock bit of claim 153, each of said projected fluid paths being a projected average fluid path.

160. A drill bit comprising:

- a bit body with a bit central axis, and defining a gage diameter;

- a first roller cone with a first cone shell, attached to said bit body, rotatable around a first journal axis;

- a first row of cutting elements attached to said first roller cone that includes a first cutting element, said first cutting element having a first cutting tip;

- a first cutting tip curve defined by rotating first roller cone with attached first cutting tip around said first journal axis;

- a first nozzle receptacle in said bit body;

- a first nozzle, installed in said first nozzle receptacle, that defines a first projected fluid path not parallel to said bit central axis and that forms a first centroid at an exit location, said centroid being located greater than 25% of the distance between said central axis and gage diameter from said central axis;

- said first projected fluid path being within 0.4 inches of said first cutting tip curve;

- a second roller cone with a second cone shell, attached to said bit body, rotatable around a second journal axis;

a second row of cutting elements attached to said second roller cone that includes a second cutting element, said second cutting element having a second cutting tip;

a second cutting tip curve defined by rotating second roller cone with attached second cutting tip around said second journal axis;

a second nozzle receptacle in said bit body;

a second nozzle, installed in said second nozzle receptacle, that defines a second projected fluid path not parallel to said bit central axis and that forms a second centroid at an exit location, said second centroid being located greater than 25 % of the distance between said central axis and gage diameter from said central axis;

said second projected fluid path being within 0.4 inches of said second cutting tip curve;

a lateral angle for said first projected fluid path defined with respect to a first plane, said first plane being defined by said bit body central axis, and by a first line lying parallel to said bit body central axis and intersecting said first centroid;

a radial angle for said first projected fluid path defined with respect to a second plane, said second plane being perpendicular to said first plane and parallel to said central axis;

a lateral angle for said second projected fluid path defined with respect to a third plane, said third plane being defined by said bit body central axis, and by a second line lying parallel to said bit body central axis and intersecting said second centroid;

a radial angle for said second projected fluid path defined with respect to a fourth plane, said fourth plane being perpendicular to said third plane and parallel to said central axis;

a reference plane perpendicular to said bit central axis;

wherein at least one is selected from the group consisting of:

a different distance from said first exit location to said reference plane than from said second exit location to said reference plane;
said lateral angle of said first projected fluid path differs from said lateral angle of said second projected fluid path; and
the radial angle of said first projected fluid path differs from said radial angle of said second projected fluid path.

161. The drill bit of claim 160, said drill bit having a diameter of at least seven and seven eighth inches.

162. The drill bit of claim 161, said first projected fluid path being within 0.3 inches of said first cutting tip curve and said second projected fluid path being within 0.3 inches of said second cutting tip curve.

163. The drill bit of claim 161, said first projected fluid path being within 0.2 inches of said first cutting tip curve and said second projected fluid path being within 0.2 inches of said second cutting tip curve.

164. The drill bit of claim 161, further comprising:

a third roller cone, attached to said bit body, rotatable around a third journal axis;
a third row of cutting elements attached to said third roller cone that includes a third cutting element, said third cutting element having a cutting tip; and
a third nozzle receptacle in said bit body that defines a third projected fluid path;

said third projected fluid path being within 0.4 inches of said third cutting tip curve.

165. The drill bit of claim 164, wherein said drill bit defines a gage diameter, said first row of cutting elements is a gage row that cuts to about said gage diameter, and said second row of cutting elements is a gage row that cuts to about said gage diameter, and said third row of cutting elements is a gage row that cuts to about said gage diameter.

166. The drill bit of claim 161, wherein said distance differs from said first exit location to said reference plane than from said second exit location to said reference plane, said lateral angle of said first projected fluid path differs from said lateral angle of said second projected fluid path, and the radial angle of said first projected fluid path differs from said radial angle of said second projected fluid path.